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CONTROLLING CANADA THISTLES.

BY

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LETTER OF TRANSMITTAL.

U. S. Department of Agriculture,
Bureau of Plant Industry,
Office of the Chief,
Washington, D. C., May 3, 1913.

Sir: I have the honor to transmit herewith and to recommend for publication as a Farmers' Bulletin a paper entitled "Controlling Canada Thistles," by Mr. H. R. Cox, Agriculturist, Office of Farm Management, of this Bureau.

This paper deals with the methods of eradication used for the Canada thistle in the United States, states how it is distributed, and how it may be prevented. It also includes a description of the plant, so that it may be recognized. It should be of considerable assistance to any farmer troubled with Canada thistles.

Respectfully,

Wm. A. Taylor,
Chief of Bureau.

Hon. D. F. Houston,
Secretary of Agriculture.

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CONTROLLING CANADA THISTLES.

RANGE OF THE CANADA THISTLE.

This weed occurs in the Northern States from Maine to Virginia, west to North Dakota and Kansas, and in the Pacific Coast States from Washington to northern California. It also seems to be spreading in the Rocky Mountain States. But few reports have been received of its presence in the Southern States and it is very probable that this weed will not be a serious pest in that region.

FIG. 1.—Top of the Canada thistle. (Reproduced from "Farm Weeds of Canada," Bulletin of the Department of Agriculture, Dominion of Canada.)

DESCRIPTION OF THE PLANT.

TOPS.

The Canada thistle (*Cirsium arvense* (L.) Scop.) may be identified by its erect, above-ground stems, 1 to 3 feet in height, its lobed and very spiny leaves, somewhat downy on the under side, and its flowers, which are generally rose purple, one-half to seven-eighths inch in diameter, clustered at the ends of the branches. (Fig. 1.)

UNDERGROUND PARTS.

Being a perennial plant, the Canada thistle propagates itself both by its underground parts and its seeds. The character of the underground growth must therefore be understood in order to attack the weed intelligently.

The root, which varies in size from one-quarter of an inch or more down to very small feeding rootlets, branches and spreads in all directions more or less horizontally. The depth of this root varies from a few inches to a few feet below the soil surface, depending on the kind of soil in which it has been formed. From any point along the root buds may form and send up root shoots, which appear above the soil surface as stems or tops of the plant. At any time during the growing season shoots in all stages of development can be found, from the most advanced down to those just starting from the roots.

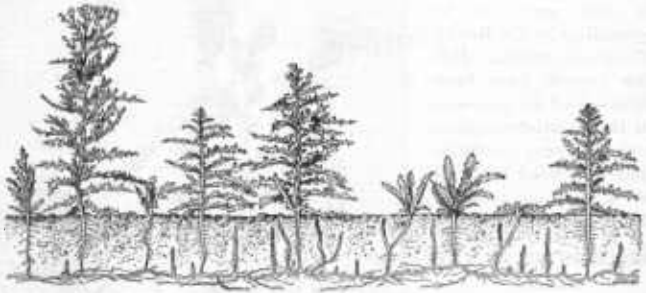

FIG. 2.—Diagram showing the characteristic growth of the Canada thistle. The shoots are illustrated in various stages of development, from the most advanced down to buds just starting from the roots.

These are shown in figure 2, which illustrates a characteristic patch of the weed when the most advanced shoots have formed their blossoms.

OTHER WEEDS MISTAKEN FOR THE CANADA THISTLE.

The common or bull thistle is often mistaken for the Canada thistle. It is usually found in pastures and other uncultivated places, since it is a biennial plant and readily succumbs to cultivation. The bull thistle may be distinguished from the Canada thistle by its greater size, by the rougher and darker green appearance of the leaves, and by its larger heads. Other plants sometimes mistaken for Canada thistles are the bird's-nest thistle in the South Atlantic States, the milk thistle on the Pacific coast, and the curled thistle in the Northern States.

METHODS OF DISTRIBUTION AND MEANS OF PREVENTING IT.

The Canada thistle spreads into new localities, from farm to farm, and even from field to field on the same farm, largely by its seeds. These seeds (fig. 3) are smooth, brown, about one-eighth of an inch long, and nearly cylindrical, being a little pointed at one end. Each seed has a tuft of hairs called a pappus. The time of seeding extends from July to October. This weed is peculiar in that only a few of the plants produce seeds that are able to grow. It is not known just what the conditions are which govern this. In most infested areas enough perfect seeds are formed to greatly increase the nuisance, so that the farmer is not justified in permitting the blossoms to mature. The principal ways in which the seeds are scattered are as follows:

Wind and water.—After the seeds mature they are easily detached from the heads by the wind and are scattered over the surrounding country. The feathered pappus bears them up, thus permitting them to be carried a considerable distance. They are also carried by run-off water down hillsides and by streams. Transportation by water becomes a special danger in irrigated districts, where the ditches and laterals readily carry the seeds over the land.

FIG. 3. — Seeds of the Canada thistle, showing, in the center, the actual size of three of them. (Drawn by F. H. Hillman.)

Small grains and straw.—Mature thistle seeds are often harvested with small grains, but are usually separated from them in threshing. It is often advisable, however, to reclean such small grain as is to be used for seed, especially in the case of oats. The thistle seeds are carried over into the straw stacks and from them through the manure to the fields; but if such manure is left in piles for several months practically all the seeds will be decomposed. Harvesting machines often carry the seeds to other fields and threshing outfits carry them from farm to farm.

Hay.—If hay is cut sufficiently early, when the thistles are just starting to bloom, there will be no danger of their maturing seed. Many farmers let their hay stand too long, not only diminishing its value but permitting the thistle to form seed.

Grass and clover seed.—Although of infrequent occurrence, the seeds of Canada thistles are sometimes found in grass and clover seed, especially in alsike clover and Canada bluegrass. It is not difficult to detect their presence by the use of a hand lens after a little practice. If in doubt a farmer may send a sample to his State experiment station or to the United States Department of Agriculture, Washington, D. C., for analysis. Farmers' Bulletin 428, entitled "Testing Farm Seeds in the Home and in the Rural School,"

is of great assistance to farmers in detecting the presence of weed seeds in commercial seed.

METHODS OF KILLING CANADA THISTLES.

After this weed has obtained a foothold the best way to eradicate it is to prevent it from sending up top or aboveground growth, which finally causes the roots to die. This is the basic principle which must be kept in mind at all times. The top of the plant serves much the same purpose as the lungs of animals, so that if the plant is continually deprived of that vital part it must soon die.

There are a number of ways of keeping down the top growth; there is no one best way for all cases. The best method for each case will depend on the farmer's rotation and convenience. Any practicable method will do.

The man, therefore, is of far more importance than the method. Many farmers make a start to kill the thistle, but abandon their efforts too soon. It is probably no exaggeration to say that 95 per cent of the efforts to kill thistles are failures. Often the campaign is abandoned when success is in sight, and the thistles soon recover. One great trouble is that farmers are looking for too easy a method; there is no "primrose path" to thistle eradication. If, however, the farmer understands the basic principle as given above in italic type, decides on a systematic plan, and then faithfully "sees it through to a finish," he will free his farm of the thistle, and this will be accomplished without a great amount of labor or expense.

The following experience with thistles is given in detail because it strikingly illustrates the importance of the man himself in weed control and because the methods used are applicable to nearly every farm.

AN EXPERIENCE IN KILLING THISTLES.

In the winter of 1910–11 Mr. Oscar Montgomery purchased a farm of 76 acres in Fulton County, Ohio. Under negligent farming it had become badly infested with thistles; every field contained patches of the weed. This fact enabled him to buy the place at a comparatively low price.

It was the general opinion in the community that the thistle had come to stay—that it was a dispensation of Providence that could not be altered. The new owner, however, knew the situation and prepared to meet it. On the farm on which he had previously lived he had fought and conquered this pest.

In the spring of 1911 he wrote to the Department of Agriculture for information on the control of the thistle and was supplied with a statement giving the experience of various farmers in killing this weed. With this in mind and supplemented by his own experience

he outlined a plan of attack. He knew that the efforts of most farmers to kill this weed were unsystematic and lacked persistence and that the insufficient treatment usually given it, far from reducing its vigor, actually stimulated it to increased growth. All his effort was to be directed toward the prevention of top or above-ground growth, as only a little top growth is usually sufficient to prolong the life of the thistle until the next year.

The various fields were to be devoted to corn, oats, wheat, hay, and pasture. Field A, of which about 3 acres were thickly set to thistles, was planted in corn in check rows, so as to permit thorough cultivation.

Following a suggestion of the Bureau of Plant Industry, he replaced the cultivator shovels with 9-inch sweeps (fig. 4), thus having an instrument which acted as a series of knives run just under the

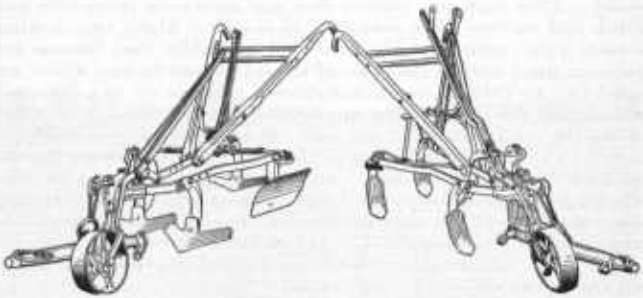

FIG. 4.—A single-row cultivator with shovels (on the right) and the same implement equipped with sweeps (on the left).

surface. Besides doing as good work in stirring the soil as the shovel or tooth type of cultivator it is much more effective, if the edges are kept sharp, in cutting off the stems of weeds. Mr. Montgomery says that to this implement is due a great deal of the credit of killing out the thistles in his cultivated crops. Some soils are too stony or otherwise unsuitable for this implement. In such cases reliance will have to be put on the ordinary cultivators, and such thistle tops as slip through between the teeth should be cut down with a hoe.

Mr. Montgomery could use this tool only until the corn was laid by, however, and since at that time many thistles were still growing he modified his plan of attack, but never lessened its vigor. Having the locations of the thistle patches well in mind he went over them with a hoe, cutting all the tops below the surface of the ground. At the start it was necessary to visit the patches rather frequently (about

once a week), but as the season advanced the intervals became less frequent. Assisted by his two children he would attend to it at some odd hour when other work was not pressing. It required about an hour's work each time. He considered it as one of the numerous chores about the place.

After the corn crop was taken off this field was plowed. In the spring of 1912 it was again planted in corn for the purpose of locating and killing any stray plants that might have persisted, but somewhat to his surprise not a thistle top appeared in the field. The weed had been killed in one season with a little extra work.

Field B was left in pasture during 1911. (Fig. 5.) On the advice of the Department of Agriculture about 2 acres of this field that were most thickly infested, together with a small infested area in an adjoining meadow, were plowed in June just before the thistle blossomed. After that, this plowed area was gone over frequently with a disk and no tops were permitted to appear. About two diskings a week were required at the start, but gradually they became less frequent, until toward the close of the season one in two weeks was sufficient. In 1912 this area was allowed to come up to a volunteer growth and not a thistle top appeared—a second example of eliminating the weed entirely in one year. Since this area was originally so full of thistles as to be practically worthless, the owner did not consider that the fallowing cost him the use of the land. This fallowing is best done in the latter part of the season, beginning about the time thistles start to blossom. It may be done on pasture land or may immediately follow hay or grain harvest. It is usually best to follow this treatment with a cultivated crop the next year to kill any of the weeds that may persist.

The rest of field B was pastured throughout the season. In the latter part of June Mr. Montgomery started to cut the thistle tops in the several scattered patches. He cut below the surface of the soil with a sharp hoe frequently enough to prevent most of them from appearing. Here, as on the fallowed area, the intervals lengthened with the waning vitality of the plant. In 1912 this part of field B was plowed and put to corn and a thorough search by this owner and the writer in September failed to disclose a single plant. Here, too, the weed had been eradicated.

Field C was in oats in 1911. Every farmer who has harvested oats with thistles in them knows the inconvenience he suffered, as well as the liability he incurred of spreading the seed to other parts of the farm. No thistles went to seed in this case. One day before they started to blossom Mr. Montgomery cut the most thickly infested patches, oats and all. Where the thistles were less numerous he cut down each of the tops with a sharp hoe. The result was that the crop of oats was entirely free from thistles. Early in the spring

of 1912 this field was seeded to grass and clover, the wheat seeding having failed owing to the severe winter. The same procedure was followed in this case as with the oats and a clean crop of hay resulted. Mr. Montgomery did not expect that this treatment would kill the thistle. His object was to produce clean crops, prevent the thistle from seeding, and weaken its vitality as much as possible. He expects this treatment to hold it in check until the field is planted to a cultivated crop.

Mr. Montgomery did not seem to regard his work with the thistle as especially burdensome. Although considerable labor was required the first year, it was scarcely to be considered when compared to the results secured. The first year's campaign was so successful that the work required in 1912 did not amount to more than two days

FIG. 5.—A view of the Montgomery farm (with the pasture, field B, in the foreground) on which the thistle was eradicated in one season.

for one man. The principal point in the eradication of thistles, and one that is difficult for many farmers to appreciate, is that this work was kept in mind at all times and attended to faithfully. Once begun it was continued persistently until the thistle tops ceased to appear.

Meanwhile the neighbors had been taking notice. Many of them on visiting the farm evinced surprise at seeing no thistles. Some of them have grasped the idea and have adopted similar methods. Several started the fallow treatment in the summer of 1912. Others have purchased sweeps for their cultivators and are hand-hoeing the thistles after laying by.

OTHER METHODS.

Various types of cultivators equipped with knives or sweeps that are effective in cutting off the tops of Canada thistles are shown in figure 6.

Although the cultivation methods here described will have to be relied on largely in killing Canada thistles, there are other methods that may be followed with considerable success. In using any of them the farmer should never lose sight of the all-important point of keeping down the top growth at all times, in order to exhaust the root. These methods are briefly discussed below.

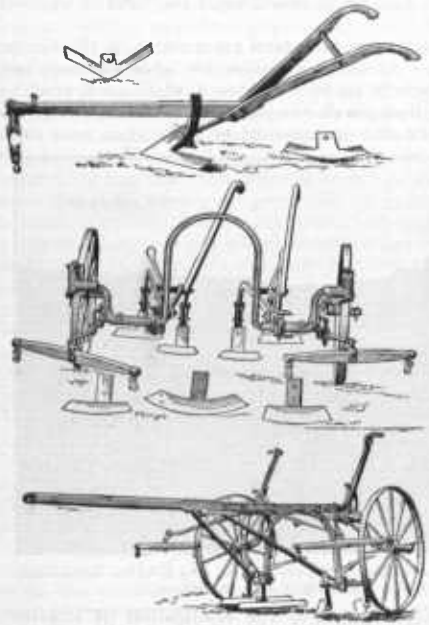

FIG. 6.—Various types of cultivators equipped with knives or sweeps that are effective in cutting off the tops of Canada thistles.

Growing smother crops.—Among the crops adapted to the purpose of smothering Canada thistles are alfalfa, clover, the grasses, millet, sorghum, hemp, buckwheat, and small grains. Their effect is not only to restrict the top growth of the thistles by shading them, but also to crowd the roots. The land should be occupied by such crops at all times, so that the thistle has no chance to make a recovery. This method seems to be the best adapted to the deeper and more productive soils, where such crops grow well and where the thistle is apt to persist for a longer period than on the shallower and less productive soils. Alfalfa is probably best for this purpose. Good grass and clover stands have also been known to rid fields of thistles.

This method is not as sure in its results as clean cultivation, and seems to be of most value in giving the weed a setback more or less

severe, which renders easier the work of clean cultivation that should follow.

Salting thistles in pastures.—The method of salting thistles in pastures is adapted to small patches accessible to live stock, especially sheep. In their effort to get the salt the stock nibble the thistles and trample them to death. It seems best to let them grow until they start to bloom and then cut off the tops close to the ground and apply a small handful of salt to each new shoot that springs up.

Spraying with chemicals.—Experiments for the purpose of permanently eradicating this weed by the application of plant poisons have not proved very practicable. This is a new subject, however, and further investigations are needed before definite advice can be given. Although the tops may be injured more or less, the plants make a renewal growth at once. Hence, it appears at present that about the only way in which this method may be of value is in preventing the thistle from maturing seed in grain fields, thereby being a substitute for the cutting practiced by Mr. Montgomery on his field C. It may be that under certain conditions spraying would be better than cutting, as in the vast grain fields of the semiarid West. The best materials for this purpose seem to be solutions of common salt, iron sulphate, and arsenite of soda, which is poisonous to man and live stock.

Methods on waste lands.—The Canada thistle commonly occurs along roadsides and fences, in woodlands, and on other uncultivated lands, where it matures seed, thus being a menace to the surrounding country. In many cases about all that can be done is to prevent seed from maturing by cutting off the tops at or below the soil surface just as blossoming starts. It will usually be necessary to make two cuttings a year to prevent seeding. Thistles in such locations can be entirely eradicated, however, by continually cutting off the tops until the roots are exhausted.

SUMMARY.

Canada thistles can be eradicated in a comparatively short time with little or no loss in the use of the land. The length of time required varies inversely with the thoroughness of the work.

In dealing with this weed the following three rules must never be lost sight of:

(1) The easiest way of killing Canada thistles is to deprive them of their tops continually, thus exhausting the roots. There are various methods of keeping down the tops; there is no one best method. Each field presents a problem in itself and must be handled according to circumstances. Usually some form of clean cultivation is the best, either with a crop or by bare fallow.

(2) Outline a systematic plan of attack.
(3) Keep the plan in mind at all times and follow it faithfully.

STATE LAWS RELATING TO CANADA THISTLES.

The following statement has been furnished by the Solicitor of the United States Department of Agriculture:

In none of the States does the law direct that the Canada thistle be entirely destroyed. In all the following States it is proscribed as a noxious weed, and the law directs its killing or destruction in such a manner as to prevent the maturing and dissemination of seed:

California.
Connecticut.
Delaware.
Idaho.
Illinois.
Indiana.
Iowa.
Kansas.
Kentucky.
Michigan.
Minnesota.
Missouri.
Montana.
Nebraska.
New Jersey.
New York.
North Dakota.
Ohio.
Oregon.
Pennsylvania.
South Dakota.
Utah.
Vermont.
Washington.
Wisconsin.